# TUBERCULOSIS

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## CONTENTS


Tuberculosis and School Personnel ..... 1
D. O. N. Lindberg, M.D., F.A.C.P.

Importance of and Accomplishments in Tuberculosis Control Among School Children ..... 8
S. A. Slater, M.D.

The Part of Local Practicing Physicians in Tuberculosis Control in Schools ..... 16
L. T. Collins, M.D.

Results of Twenty Years of Mantoux Testing in Schools ..... 22
L. S. Jordan, M.D. and Kathleen Jordan, M.D.

Tuberculosis Control and Teaching Tuberculosis in Schools ..... 28
Dan Morse, M.D. and R. H. Runde, M.D.

Can Tuberculosis Be Eradicated in School Children? ..... 37
Edwin R. Levine, M.D.

Personal ..... 7
John Sundwall, M.D.

Editorial ..... 45

The Committee on Tuberculosis ..... 45
Jay Arthur Myers, M.D.

Abstracts and Notes ..... 47, 48

Meeting ..... 50



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THE JOURNAL OF SCHOOL HEALTH

*Devoted to the interests and advancement of school health service and instruction. Your participation by membership is solicited.*

Vol. XXI JANUARY, 1951 No. 1

## TUBERCULOSIS AND SCHOOL PERSONNEL*

By D. O. N. LINDBERG, M.D., F.A.C.P.

*Superintendent and Medical Director, Utah State Tuberculosis Sanatorium; Ass't Clinical Professor of Medicine, University of Utah, College of Medicine; Tuberculosis Consultant, Utah State Department of Health.*

In the fight to eradicate tuberculosis as a disease inimicable to public health and thus prevent its closing the door to the future for so many yet to enjoy the most productive and rewarding years of their lives, we must, even in the presence of an apparent reduced national mortality rate from this disease,[1] remain alert to the need for detecting and eliminating any sources of infection for our children.

Since the school is where children are most (in numbers of hours) in contact with individuals outside the home, it assumes an importance in the list of potential sources of infection among adults. Thus, it follows that all school personnel should be unequivocally certified as being free from communicable pulmonary tuberculosis before embarking upon the profession which brings them into close contact with numbers of children.

If such careful certification is not required, who can say that the janitor, who coughs into the air that children breathe, is not the prototype of the phthisic grandfather who, not feeding up to much else, spends most of his time holding (and infecting) his youngest grandchild. Further, who can say that any teacher not certified from the standpoint of tuberculosis is a safe risk for close contact with young children.

Most States do not require this certification specifically, though Boards of Health and School Boards would be within legal rights to do so under the general provisions on statute books of practically all States which say in effect, "The local Boards of Health shall have jurisdiction in all matters pertaining to the preservation of the health of those in attendance upon public and

* Read at a meeting of the American School Health Association, St. Louis, Missouri, October 30, 1950.

1. The NTA BULLETIN, September, 1950, page 121.

private schools, and it is hereby made the duty of each local Board of Health to exclude from school any person, including teachers, suffering with any contagious or infectious disease, whether acute or chronic."[2]

In these days of the acute teacher shortage, beleaguered School Boards hesitate to make any seemingly unnecessary requirements of otherwise qualified candidates in the field of education. Also, with the advent of mass surveying on a wide scale, this aspect of tuberculosis control is apt to be less emphasized on the basis that sooner or later everyone gets a chest film. However, the fallacy of this theory lies in the fact that practically all mass surveying, among the general adult population, is done on a voluntary basis, and in many instances the very individuals who may feel uncertain about their health usually find it convenient to be not included in these surveys.

Within our own experience, a case in point was that of a young lady teaching the first grade in one of the schools selected for inclusion in a certification program for teachers. Immediately upon being informed of the requirement, she resigned her position and moved to another State. Investigation revealed that this individual had actually been diagnosed as a far advanced case of active pulmonary tuberculosis in another city, and perhaps not realizing the susceptibility of children to infection by contact, felt that she could accept a teaching position at a distance from the scene of diagnosis and exercise proper care to prevent the transmission of her disease. Yet, a tuberculin-X-ray survey of her new pupils revealed the following hard facts:

(a) 40.0% reactors as compared to 8.6% among the general population of like age in that area.

(b) Of 35 first graders, X-ray examination disclosed 13 children with active tracheobronchial tuberculosis; two with quiescent hilum tuberculosis; and one child with unilateral tuberculosis bronchopneumonia, for which sanatorium regime was required.

*Inasmuch as the incidence of adult type tuberculosis is at least FIVE times*[3] *greater among those who had childhood contact with active cases than it is for the general population,* the far-reaching effect of this teacher's contact with these children must be estimated in loss of life or loss of productivity due to the need for treatment which would arise among them when emerging into

2. Health Laws, State of Utah, 1943. Title 35-3-8.

3. Lindberg, D.O.N.: A Manual of Pulmonary Tuberculosis and An Atlas of Thoracic Roentgenology, 1943. Charles C. Thomas, Springfield, Illinois.

young adulthood. It should be pointed out, however, that such instances demonstrating educational lack of knowledge of the subject of the communicability of tuberculosis are the exception rather than the rule.

The school personnel, generally speaking, may always be counted upon for intelligent cooperation in any health project, and most teachers diagnosed in a certification program were entirely unaware that they had tuberculosis prior to the examination. Myers[4] has cited a case where a teacher had a routine contact examination because of contact with her mother, who had been found to have tuberculosis, and although feeling entirely well, the daughter had an active lesion. Among the children whom she taught 71% reacted to the tuberculin test as compared to 11% in adjacent districts.

Teachers participating in a certification program should be in a position of feeling that if "diagnosed" they will be given such leave of absence as required to attain an arrest of their tuberculosis, with acceptance back into their educational field positions without prejudice. In one county-wide survey,[5] involving the examination of 705 teachers, of whom 9 (or 1.3%) were found to have active pulmonary tuberculosis, all accepted and completed treatment, and returned to their professional educational work.

More recently, industry and the armed forces have required an examination, including a chest film, of recruits as a matter of course. Industrial management and government alike have realized the value of this protection against the liability for disability compensation payable to those who may have actually had latent or active tuberculosis prior to employment or induction.

In Denmark, the School Physicians Act of 1946[6] introduced a compulsory annual tuberculosis examination of all personnel at schools. Until a similar measure is in effect in our own country we must endeavor to bring about the elimination of this potential source of tuberculosis infection insofar as possible through voluntary certification, and it can be done in every community of our nation with proper local planning. A laudable step in this direction was taken when the Committee on Tuberculosis of the

4. Myers, J. A.: Tuberculosis Among Children and Adults, page 185. Third edition, 1950. Charles C. Thomas, Springfield, Illinois.

5. Lindberg, D.O.N.: The School Teacher As a Source of Tuberculosis Infection — Report of an X-ray Study, Illinois Medical Journal, October, 1935.

6. The Fight Against Tuberculosis in Denmark, published by The National Association for the Fight Against Tuberculosis, 1950.

American School Health Association decided to recommend a school Accreditation of Schools with reference to tuberculosis activities in progress.[7]

If at all possible, in connection with school certification of personnel, provision should be made for priority treatment facilities for any cases uncovered by the project. The most recently established statistics point to the fact that our national admission rate to sanatoria is at its highest level, in spite of the lowest national mortality rate from this disease. Waiting lists for admission to sanatoria, too, indicate that more cases are seeking proper treatment than ever before, demonstrating the effectiveness of the general educational programs concerning pulmonary tuberculosis.

*Procedure of Examination*

In a project that has for its objective the elimination of reservoirs of tuberculous infection for the protection of the school child population, the methods of examination must admit of no compromise, and should be those universally accepted as diagnostically accurate in this field.

*Tuberculin Test*: *Individuals of all ages among the school personnel should be given the intradermal tuberculin test.* This examination would serve (1) To establish information relative to the incidence rate of infection in the group; (2) As an aid in the matter of differential diagnosis, inasmuch as a certain number of non-tuberculous lung states would inevitably be found; (3) To lessen the cost of the survey by reducing the number of chest X-ray films needed.

*Reactors*: 14 in. x 17 in. stereofilms. Here is not the place for roentgen-photofluorography techniques, a gross screening process at best. The opportunities for inaccuracies of miniature film diagnoses is shown by the fact that current medical literature dealing with the control aspects of tuberculosis are repetitious in making recommendations to the effect that small lesions may be so readily missed with the rapid type of interpretation required under mass survey conditions. In one community, recently discharged sanatorium patients, whose residual lesions were present as small areas of fibrous changes, immensely enjoyed receiving reports of "Negative" following mass survey examination by a mobile unit. It must be observed, however, that these mass X-rays surveys are contributing importantly to case-finding of asymptomatic tuberculosis. The illustration is offered merely to show that

7. Myers, J. A.: Invited and Conquered, page 572, 1949, Minnesota Public Health Association, St. Paul.

it can never be "a court of last resort" when the matter is so crucial as the avoidance of contact between children and adult sources of infection.

The superiority of the 14 in. x 17 in. celluloid film, diagnostically, over all films of smaller dimension, however technically good, was clearly established by the American Trudeau Society Committee on X-ray Apparatus and Technique[8] approximately a decade ago. From a tuberculosis diagnostic standpoint, the use of the stereo-film is mandatory if one expects to state unequivocally that pulmonary tuberculous lesions do not exist, for in the files of every phthisiologist there may be found films demonstrating that minimal lesions may be entirely hidden behind the superimposition of a rib or clavicle on one film of a stereo pair. An illustration: J. E., woman physician, while serving a residency in a Midwestern teaching hospital, was concluding her term of service in macroscopic pathology and thought it advisable to have her chest X-rayed on a single conventional 14 in. x 17 in. celluloid film. The resident in radiology interpreted this film as being free from evidences of tuberculous infiltration. Subsequently, and within a period of 90 days, Dr. J. E. had symptoms, chiefly relating to easy fatiguability, and a repeat chest X-ray film showed a scattered involvement of approximately two-thirds of the left lung with a coin-shaped shadow 2 cm. in diameter suggestive of cavitation. In the contralateral lung there was evidence of a very recent spread from the original focus on the left side. The sanatorium authorities were confident that such an extensive lesion must have had some evidence of its existence three months prior to the onset of her clinical state, and sure enough a reinterpretation of her original film with more experienced eyes revealed a left apical lesion, almost completely hidden by a superimposition of the rib shadow marking. This physician has subsequently made a complete recovery and is now teaching the subject of pathology in her alma mater medical school.

Active cases of pulmonary tuberculosis should be recommended for sanatorium care, while those with inactive tuberculous lesions would be re-examined at designated intervals as quarterly, semi-annually, annually or oftener if manifesting any symptoms. Reactors having "negative" chest films should be refilmed annually, preferably using the 14 in. x 17 in. stereoscopic films.

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8. Report of Committee on X-ray Apparatus and Technique, Evaluation of various methods of Roentgenography of the Chest, The American Review of Tuberculosis, October, 1941.

Formerly, it was the consensus among chest physicians that adults having achieved the age of thirty without development of an adult type lesion could be considered to have little likelihood of developing active pulmonary tuberculosis. This conception has been modified in recent years, due, perhaps, to better diagnostic methods, or to the fact that many individuals attain higher ages before encountering tuberculous infection than in years past when the incidence of tuberculosis was over 100 per 100,000 population. A rather exaggerated as well as dramatic illustration of the necessity for keeping reactors under continued observation while remaining in the school system is the case of an elderly school physician. His mass X-ray project film showed healed calcification changes and was otherwise negative as far as active adult type pulmonary tuberculosis was concerned for all through the years, until at the advanced age of 80 he became ill with a pneumonic type of tuberculosis lesion of bilateral extent, associated with a Gaffky 6 sputum.

*Non-Reactors (To tuberculin test)*: 14 in. x 17 in. single chest films should be utilized even for this group, if serving to preclude against error attendant upon potency, administration and interpretation of the intradermal tuberculin test. *Non-reactors to tuberculin should be given the tuberculin test annually, or oftener, as long as remaining negative.*

Occupationally considered,[9] school personnel have no greater incidence of tuberculosis than the population in general of like economic level, probably in the neighborhood of 0.4% at this time. On the other hand, it must not be forgotten that they also do not have a lower incidence rate than their contemporaries, and so cannot be overlooked as possible sources of tuberculous infection for children.

*Only when a complete certification program is carried out and maintained through the years can the removal of a teacher source of infection be accomplished.*

*SUMMARY*:

1. All school personnel should be certified as being free from pulmonary tuberculosis if the school child is to be protected from this exposure opportunity.
2. In the absence of enforced legislation requiring such certification, this objective may be reached only through community health planning and cooperation.

9. Whitney, Jessamin: Death Rates by Occupation, page 30, 1934, National Tuberculosis Association, New York, N. Y.

3. Examination methods should utilize the most accurate diagnostic procedures in use today in the field of diseases of the chest. Compromise on this point should be avoided.
4. After initiation, the process of maintaining certification is relatively a routine measure, but essential to the continued prevention of contact with active pulmonary tuberculosis for children of school age.

* * * * *

## JOHN SUNDWALL, M.D.

Notice has just been received at the Editorial Office of the Journal of School Health of the death of Dr. John Sundwall at Ann Arbor, Michigan, on December 13, 1950.

Doctor Sundwall, one of the earliest members of the American School Health Association, a Past President of the Association, and a recipient of the William A. Howe Honor Award, had spent a long professional life in various health positions. He taught at the Universities of Chicago, Utah, Kansas, Minnesota and Michigan. At Michigan he was for a long time Director of the Division of Hygiene and Public Health, and organized there the School of Public Health.

His many former students will sincerely mourn the loss of a great teacher and sincere friend, as will the hundreds of members of the American School Health Association, who knew and admired him greatly. *C. H. K.*

## IMPORTANCE OF AND ACCOMPLISHMENTS IN TUBERCULOSIS CONTROL AMONG SCHOOL CHILDREN*

S. A. SLATER, M.D.

*Superintendent and Medical Director Southwestern Minnesota Sanatorium, Worthington, Minnesota.*

It should be recognized that any program for the control of tuberculosis must be conducted over an extended period of time. Marked and permanent results cannot be expected immediately. Any program which does not include the school population will be largely a failure. Working in the schools does much, not only in the direct control of tuberculosis, but also in the general health education of the students and faculty. While I am not minimizing the importance of the proper care of cases of tuberculosis after they have been discovered, we believe that this measure alone will never be sufficient to eradicate the disease. Often when the clinical case has been discovered it has advanced to a point where the seeds of tuberculosis have been planted in others, who will be potential cases unless found and taught how to prevent the development of this disease. Experience has shown that health supervision of infected persons may be the means of preventing the development of active disease. These can be found by means of the tuberculin test. This test is one of the most valuable aids we have in the fight for the eradication of tuberculosis. Many have not appreciated its real value. Had it been used as it could and should have been, the death rate in many places would be much lower than it is today. The tuberculin test is one of the most reliable tests in medicine when properly administered, using potent tuberculin of proper dosage, and correctly read. It detects those persons who have living tubercle bacilli in their bodies. Not everyone who is infected with the germs of tuberculosis will break down, and it is known that when precautions are taken very few will develop clinical disease.

Years ago it was thought that from 80% to 100% of the children were infected with the germs of tuberculosis before they reached fifteen years of age. These figures were quoted without thought of how they were obtained, nor the fact that they did not give a true picture of the number infected in the country as a whole. They were obtained in the larger cities where some member of the family was a patient in a clinic because of tuberculosis.

* Read at meeting of the American School Health Association, St. Louis, Missouri, October 30, 1950.

Under those conditions a high percentage of the children would be infected. In our first tuberculin testing experience in a rural community where the people lived well, it was found that 82% of the children coming from homes where there was clinical tuberculosis were infected with the disease, while the percentage of reactors in the school population as a whole was only 10%.

In order to understand what has been accomplished in the schools of the Southwestern Minnesota Sanatorium district, one will have to get a mental picture of the setup, as well as the conditions under which the work was started. At the present time the Southwestern Minnesota Sanatorium district comprises ten counties located in the southwestern part of Minnesota, and serves a population of approximately 180,000 rural people living in a good agricultural region. The largest town in the district has a population of about 20,000, the next approximately 8,000, and there are many smaller ones. When I took charge of the sanatorium in 1919 there were only eight counties in the district. For several years the sanatorium of fifty-six beds was full and had a long waiting list. An intensive case-finding program was carried out and by 1930 we began to have vacancies, so that it was possible to admit another county without having more patients than could be accommodated. In 1945 the tenth county, which has a population double that of any other county of the district was admitted, and the sanatorium was not overcrowded. At the present time the sanatorium is just a little more than half full, and more than half of the patients are from outside the district. To make one appreciate how this was accomplished one will have to consider the program. We have always felt that taking care of patients in a sanatorium is only a small part of what an institution should do, regardless of whether it is a state or a local sanatorium. To get the best results an educational campaign should be conducted regarding tuberculosis. It is necessary that the physicians be made to realize their part in the campaign and encouraged to carry it out. There is no single weapon to be used in the fight against tuberculosis, but if it is ever to be eradicated we must use every weapon at our command and use them wisely.

To win the fight, we must have facilities to care for the clinical cases, but more important, we must find those persons who have become infected as a result of association with tuberculous patients before they knew they had the disease. If they are taught how to take care of themselves, very few, if any, need break down. One cannot help but be impressed with the truth of

this statement when one realizes that at the present time, rarely is a young person admitted to the sanatorium from the district proper, while many of those admitted from outside the district are young persons. Last year 30% of the patients admitted to the sanatorium from the district were under thirty years of age. This is in striking contrast to the statistics for the year the sanatorium was opened, when 66% of those admitted were under thirty.

Following the opening of the sanatorium in 1919, chest clinics were held throughout the district. This may be looked upon as a crude way to find tuberculosis now, but it proved a most valuable aid. It was not customary to make an immediate diagnosis of tuberculosis at the clinics. They provided an opportunity to examine persons who had been exposed to the disease or had symptoms of tuberculosis. Those found suspicious were instructed to send in specimens of sputum, keep a temperature record for a week, and then report to their family physicians. A letter was sent to each physician concerned, stating that one of his patients had attended our clinic and we considered him a suspect or a definite case, but we were referring the patient to him for the final diagnosis. This procedure had a twofold purpose. It made the private physician realize that we were not stealing his patient and made him aware of the fact that he was an important person in the fight against tuberculosis. Regardless of the fact that this was a crude method of finding tuberculosis, it was the best we had at that time, and many cases were discovered long before they would have come to light had such a method not been used.

Soon after the opening of the sanatorium, short courses in tuberculosis (with experts as teachers) were conducted at the institution for the physicians of the district. These proved to be popular, as well as very valuable. The physicians were made to realize that this institution was not just a place for the far advanced and dying cases. They became aware of the fact that it was to their best interest to find cases as soon as possible and to see that they were admitted to the sanatorium. Not only did this give the patient the best chance to recover, but it also protected those with whom he might be associated. The family physician was urged to examine other members of the family to see if any unsuspected cases might be present. This cooperation between the physicians and the sanatorium has brought results which would not have been accomplished otherwise.

We did not realize the value of the tuberculin testing program in the fight to control tuberculosis when we started the program

in this district. The figures reported in most of the text-books being used in the medical schools in the 1920's indicated that 80% to 100% of children were infected with tuberculosis. We believed that these figures were obtained in studies made under conditions where the number inefcted would be great. We wished to prove that they did not give a true picture of the infection rate among the children of the country as a whole.

A report of the early tuberculin testing of school children in this district was made at a meeting of the National Tuberculosis Association in Atlanta in 1924. This study covered the testing of over 1,600 children, the greatest number that had been covered in one report previous to that time. It was found that only 10% of the entire group were infected. However, among those children who came from homes where there were known cases of tuberculosis, 82% were infected. It was this fact that made us realize that the tuberculin test could be a most valuable aid in our case-finding program. Testing the school children with tuberculin was then started in the counties of the sanatorium district. The incidence of infection was low in all the schools, but some showed a smaller percentage of reactors than others. On further study it was soon learned that when the number of reactors was high the number of people having tuberculosis in that locality was likewise high. The tuberculin test proved to have a twofold purpose — it found those children who were infected with the germs of tuberculosis, and it pointed out possible sources of infection. Chest X-ray films were made of all reactors. This was done for its educational value in the early grades, and for both the educational value and for the finding of possible cases in the older pupils. Some do not appreciate the value of testing the young students, since clinical tuberculosis is rarely found among them. They do not realize that the presence of a reactor among the kindergarteners or first graders is exceedingly important, as it is likely the child was infected in his home, making it easy to find the source of infection. Naturally, it is more difficult to find the source of infection of the older child because the number of contacts and area of association have broadened to a great extent.

Early in the program, the contribution a field nurse could make to the case-finding activities was recognized by the sanatorium board and medical director. A public health nurse was a member of the sanatorium staff for the greater part of the time since the institution was opened. She worked with the physicians of the district, school personnel, and the general public, organizing

chest clinics and tuberculin testing surveys, encouraging the medical supervision of known cases and the examination of contacts, and assisting with the educational program of the institution. The greatest part of her time was spent in making follow-up home visits on children who were found to have tuberculin reactions when tested in the school survey. A number of unsuspected cases were found in this way. This position was discontinued in 1947, as by that time most of the counties in the district were served by county and school public health nurses and the district staff of the Minnesota Department of Health. The program that has been carried on in the schools throughout the district has brought results that have not been demonstrated elsewhere, so its value cannot be discounted.

One of the most gratifying results is that one seldom finds a young person from the district developing tuberculosis and needing sanatorium care. Those who are found to be infected are taught how to avoid a breakdown. I believe the work the sanatorium has done outside of its walls, particularly in the schools, has been of greater value than the physical care of the patients in the institution, although that has been valuable and necessary. The cost of this part of the program has been small compared with that of operating the sanatorium.

This paper is based on experience and results obtained over the last thirty years. Let's look at these results: When the sanatorium was opened in 1919 there were eight counties in the district, with a total population of approximately 120,000. During the first year, there were 67 deaths from tuberculosis in these eight counties. The number of deaths has fallen steadily and rather rapidly. Last year there were eleven deaths, an average of a little more than one per county.

Minnesota has a system of accrediting counties for results accomplished in the control of tuberculosis. The requirements for county accreditation are: The average annual death rate over the previous five years must be no more than 10 per 100,000 population; at least 90% of the members of the senior classes of the high schools must be tested with 1 - 1000 O. T. or its equivalent and not more than 10% may show a reaction. The first county in the state to meet these requirements was in this district, and was accredited in 1941. Its death rate for the previous five years was 7.6 per 100,000. Since that date all the original counties of the district except one have been accredited, and that county has only to have its seniors tested to qualify. We also have a system

of certification of individual schools based on tuberculosis control work in progress. Another speaker will discuss this phase of the work.

At this point I want to emphasize the importance of co-operation. The only original county of the district that has not been accredited is one which did not cooperate wholeheartedly in the program when the sanatorium first opened. The people there learned the hard way, and regretted it when they found all the other counties accredited and they alone not eligible. They are cooperating wholeheartedly and doing everything possible now. It will be some time before the counties entering the district later can reduce their death rates sufficiently to be considered for accreditation. These points I think emphasize the value of the program which has been carried on in the schools of the district.

I do not have any objection to mass X-raying and consider it a most valuable aid when the death rate is high. It is not needed in the counties of the district where the death rate is low. To use it would be a detriment rather than a help, for all too frequently it gives the individual a false sense of security. When he has had an X-ray inspection of the chest and no trouble is evident he considers himself to be free from disease and takes the attitude that he is safe and nothing can happen in the future. This feeling of security often proves disastrous. To carry out an X-ray campaign throughout these counties would cost too much and entail too much work in relation to the results which would be obtained. Seeing a mobile X-ray unit come into a locality appeals to the public; it is really quite a show. Those who would be interested in putting on an X-ray program in the district would be ignorant of its value or more interested in putting on a show than in the eradication of tuberculosis.

Anywhere that tuberculosis is to be eradicated the tuberculin test will have to be used finally. Finding the clinical case does not solve the problem. It is important that those in whom the seeds of tuberculosis are planted be found and taught what to do to prevent a breakdown. The program we have been carrying out in the schools and looking for the source in the homes and other places has brought results that have not been equalled any place in the world.

It is true that some parts of the country have as low a death rate as we have, but if all conditions are taken into consideration it will be noted that their death rates have always been low, while

ours was high originally, but has been reduced so that it compares favorably with that of any place.

This paper is based entirely on experience, and is intended to show what can be done. I realize our program could not be applied to all parts of the country, but it could be used successfully in many places and would give better results than are being obtained by methods in use. Under the direction of Blanche de Koning of Grand Rapids, Michigan, this method has been used with equally gratifying results. Grand Rapids enjoys the distinction of having the lowest death rate of any city of comparable size or larger in the country, if not the entire world. Other places where this program has been carried out show results more satisfactory than that obtained by any other method so far devised. There are places where the mass X-ray and other methods will have to be used to reduce the death rate to a point where the tuberculin testing program can be used effectively. In the last phases of the eradication of tuberculosis the tuberculin test will have to be used to find the last potential cases.

During the past forty years, I have heard many speakers with theoretical ideas predict that if certain things were done (usually entailing great expense) tuberculosis would be wiped out within a certain period of time — ten to twenty years. If they understood tuberculosis from a practical standpoint, they would know that their statements were untrue. Marked progress has been made and the death rate from tuberculosis has been reduced so greatly that I am afraid some have a tendency to look upon the problem lightly and feel that the fight has been won. This is not true and the last mile will be the hard one. It will not be reached during the lifetime of anyone present. If every case of tuberculosis could be found and placed under treatment immediately, those infected by these patients would be potential cases throughout their lives. Experienced people caring for tuberculosis have known persons to break down when they had reached an advanced age, who gave a history of being infected early in life by members of their families when these persons were only a few years old. It cannot be positively stated that the germs of tuberculosis had been in the patients' bodies all these years, but it is only reasonable to suppose so. None of us know just why people break down with tuberculosis; we know many who are infected never fall ill and some other condition than the presence of infection may cause one to develop active tuberculosis.

The use of B C G may be justified under certain conditions.

Personally, I am strongly opposed to its use generally for many reasons: First, we have not had ample proof that these germs in the human body under favorable conditions may not become virulent; secondly, its use would be decidedly detrimental in a locality where the death rate is low, for it would destroy the value of the tuberculin test; third, according to its enthusiasts its so-called immunity lasts only five or six years, which, if true, makes it of absolutely no value. In the large number tested in our schools not a single pupil who reacted to tuberculin has broken down in less than five years. Having germs of tuberculosis in the body makes one a potential case, and only death from some other cause will remove the threat of a break down.

The outlook for the eradication of tuberculosis is not discouraging. We have come a long way and accomplished much. We must guard ourselves and continue the struggle. I feel that our program has been highly successful. Every effort should be exerted to prevent the entrance into the body of the germs of tuberculosis. Those who have the germs in their bodies should do everything possible to prevent a breakdown.

I trust something may be found that will make the prevention of tuberculosis possible or a specific cure will be discovered. As yet neither of these has been discovered. Proper evaluation of the disease and proper handling of the case may prevent a breakdown. Treatment with the facilities we have at hand has brought good results, but there is no absolute cure. Wider use of tuberculin testing programs when such are practical, is the best method known at the present time to hasten the eradication of tuberculosis.

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# THE PART OF LOCAL PRACTICING PHYSICIANS IN TUBERCULOSIS CONTROL IN SCHOOLS*

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It is unfortunate that a few simple procedures which will control tuberculosis are not more widely utilized. These procedures are not new to tuberculosis workers. Livingston Trudeau, William Osler and many others interested in tuberculosis control, emphasized the importance of the participation of the practicing physicians in all efforts to control tuberculosis. J. A. Myers has, for the past twenty-five years, practically stormed this country, preaching and pleading for the participation of the practicing physician in all programs for the control of tuberculosis. He has stated that every doctor's office should be a Clinic for the early recognition of active tuberculosis.

The success of any tuberculosis program will be in direct proportion to the cooperation and the participation of the local practicing physician.

The purpose of this paper is to show how the practicing physician can be made tuberculosis minded through a school health program.

It has been observed that wherever the practicing physicians have become interested in tuberculosis, and have learned the importance of tuberculin testing their patients, to detect the presence of tuberculous infection, the following sequence of events occurs rather soon:

1. There will be a marked decrease in the number of deaths from tuberculosis in that community.
2. There will follow a marked decrease in the number of beds needed to treat active cases of tuberculosis in that community.
3. There will be a marked decrease in the number of high school students reacting to tuberculin, indicating a decrease in the number of persons infected with the tubercle bacillus in that community.

Minnesota, Iowa, Grand Rapids, Michigan and many other places are excellent examples of this observation.

I wish to report my own experience in four counties in Illinois, where the school program was the most essential factor in

* Read before the Annual Meeting of the American School Health Association at St. Louis, October 30, 1950.

improving the tuberculosis situation in these counties.

A tuberculin testing program was started in the high schools of DeKalb County in 1938. The program was similar to that of Dr. Slater, Dr. Jordan, Mrs. DeKoning and many others, who built their tuberculosis control program around tuberculin testing in the schools.

A talk was given at an assembly in each high school a week before the tuberculin testing was done. These talks emphasized the importance of being examined for tuberculosis each year. The tuberculin test, and what a reaction or a non-reaction to tuberculin indicates, was explained to the students. Case histories of students who had neglected to be examined for tuberculosis, and later discovered they had tuberculosis, only after the disease had become advanced were compared to the case histories of students who did not take a chance, but were examined for tuberculosis, and unsuspected active tuberculosis was discovered. The advantage of discovering tuberculosis while in the early stages was compared to the disadvantages associated with advanced tuberculosis.

The wisdom of having a routine annual x-ray inspection of the chest to detect possible active tuberculosis was likened to the wisdom of protecting, through insurance, an investment in a home against possible loss by fire. People do not take out insurance because they expect to have their homes destroyed by fire, but knowing it could happen, they wisely protect their investment against this possible loss through insurance. Likewise, people are examined for tuberculosis so that if they should develop this disease, it will be found during the early stages when they will have all the benefits of early diagnosis.

All students and employees of the high schools of the county were offered the tuberculin test. Reactors were offered x-ray inspection of the chest. Those with positive tests and abnormal shadows on their x-ray films were followed through the family doctor at the sanatorium clinics.

The tuberculin tests were done by the practicing physicians in the community where the high school was located. This, I think, is the most important part of the entire program. The doctors were invited alphabetically, and their response was excellent. They all seemed pleased to have an opportunity to participate in the program.

Letters were sent to the parents of each student who was a non-reactor to tuberculin, explaining its meaning and the import-

ance of having a tuberculin test each year as long as they did not react to tuberculin.

Letters were sent to the parents of each student who was a reactor to tuberculin, explaining what a reaction to tuberculin means, and the importance of an annual x-ray inspection of the chest of each reactor. The result of the x-ray inspection of the chest was included in the letter. Reports on all examinations were sent to the practicing physician named by the student. Records of all persons examined — non-reactors and reactors — were kept in the office of the high school, and in the file at the sanatorium. The x-ray films were kept at the Sanatorium.

Letters were also sent to all adults living in the same households as students found to be reactors to tuberculosis. This letter urged these adults to be tuberculin tested, and if found to be reactors to be sure to have x-ray inspection of their chests. These films could be had free either by a mobile unit, or when possible at any of the sanatorium clinics.

All persons whose x-ray films showed abnormal shadows were referred to their family doctors who made all follow-up studies.

The school nurses were instrumental in getting a high percentage of the students to be tested, and also extremely helpful in seeing that all reactors had x-ray inspections of their chests. The doctors and the school personnel gave indispensable cooperation in all follow-up studies.

This type of program proved effective in bringing tuberculosis education into many homes of the people in the county. As the program progressed, many persons went to their family doctors and requested examinations for tuberculosis. Occasionally such a person would be found to have active tuberculosis. This always stimulated the doctor's interest in tuberculosis and led to the examining of more individuals for tuberculosis.

The participation of the practicing physician in the school program increased their interest in tuberculosis. A doctor would often express surprise when a student from a family, for whom he had been the family physician for many years, would show up with a tuberculin reaction at a school where he was doing the testing. Knowing this family so well, it was difficult for him to believe that this child had been infected with the tubercle bacillus. Such experiences would always arouse the interest of the doctors in tuberculosis. It was quickly noticed that the doctors who took part in a school tuberculin testing program

were the first to start testing their private patients. It was observed that some of the doctors did not become interested in tuberculosis until after they had participated in a school tuberculin testing program.

As the program progressed, more and more doctors began using the tuberculin test in private practice. Many of them began testing most of their adult patients. Practically all soon began testing any patient who had a cough, lost weight, run a low grade fever, complained of pain in the chest, felt tired or showed blood in their sputum.

All positive reactors were given chest x-ray inspections. Most pregnant women are given the tuberculin test as a routine part of their general examination. This resulted in finding many cases of tuberculosis while the disease was still in the early stages.

We now rarely find a patient whose tuberculosis has been overlooked because it was not suspected, or because other symptoms masked the tuberculosis. Over 50% of all new cases discovered in DeKalb and LaSalle Counties in recent years, were discovered while the disease was in the minimal stage. For many years, an early diagnosis of tuberculosis has been recognized as the solution for the control of tuberculosis.

I should like to report to you the results obtained in four counties in Illinois from this type of school program, which was started in DeKalb County in June, 1948. The population of the county was 35,000, mostly rural.

There had been eleven deaths from tuberculosis in 1937. The average for the previous five years was fifteen. There were 33 patients in the sanatorium, and several who refused sanatorium care. 30% of the high school students tested reacted to tuberculosis.

In 1940, only two patients died from tuberculosis. The annual number of deaths from tuberculosis since 1940 has varied from two to four. There has been one death from tuberculosis so far this year. The number of patients in the sanatorium has varied from nine to thirteen in recent years. All patients for whom sanatorium treatment was recommended, have been admitted. Last year 16% of the high school students were found to be reactors to tuberculin.

The program was started in LaSalle County, September, 1938. This county has a population of 100,000, and has many small industries. There are many foreign born or first generation of foreign born persons. In 1938, 48 persons died from tuber-

culosis. In 1942 only 10, and the average annual number of deaths from tuberculosis from 1942 through 1945 was 12. There were three from tuberculosis from January 1, 1946, to September 1, 1946.

A new sanatorium of 86 beds was completed in October, 1941, but at no time did we have more than 74 patients. There were 33 patients in the institution September, 1946, and only five known active cases in the county who refused sanatorium care.

In 1938 and 1939 33% of the high school students tuberculin tested were reactors, but only 20% in 1945 and 1946. Only about 70% of the students accepted the test in 1938 and 1939, while 98% were examined in 1945 and 1946.

The program was started in Madison County (population of 180,000, mostly industrial) September 1, 1946. There are quite a number of foreign born or first generation foreign born in the county. There are also a considerable number of persons who move into Madison County from neighboring states and quite often thereafter are found to have tuberculosis. The tuberculosis problem in this county is therefore quite similar to that of any city of the same size.

There had been a tuberculin testing program in the county for several years, but only seniors and freshmen were offered the test, which was optional. All seniors and freshmen were urged to have x-ray inspections of the chest, regardless of the result of the tuberculin test. This policy had a tendency to discredit the tuberculin test. Why be tested? The x-ray is more important they were told. All of the educational value of the tuberculin test was lost. Two doctors did all the testing. The practicing physicians were not invited to participate in the program.

Starting with the fall of 1946, the program was changed to that outlined above. Again the response of the practicing physicians was excellent. Previously, none of them ever tuberculin tested their patients. As the program progressed, the practicing physicians in increasing numbers began using the tests on their private patients. It was noted again that the doctors who participated in the school testing were the first to begin tuberculin testing private patients. Very few pregnant women now escape the routine tuberculin test unless they are already known to be reactors, and all reactors are given an x-ray inspection of the chest. In 1947, there were nine women in the sanatorium with far advanced tuberculosis, who had given birth to babies within the previous year. There have been but two such cases in the past two

years. There have been none so far this year, but nine early cases of tuberculosis have been found in pregnant women through a routine x-ray inspection of the chest.

The following results obtained in Madison County since the introduction of the above program are interesting, and again emphasize the importance of the participation of the practicing physicians in the School Health Program for the control of tuberculosis.

Forty-three deaths occurred in Madison County from tuberculosis in 1946, twenty-four in 1949; thirteen in 1950, to date. There was a waiting list of 16 patients on September 1, 1946, but none at the present time. In fact, an average of 20 to 25 out of county patients are now being cared for at the Madison County Sanatorium.

In 1949, 22.5% of all students examined, were reactors to tuberculin. We have every reason to believe that this percentage will be lower in the near future. It is too early to see any marked change in the evidence of infection in the high schools, but we feel certain there will be a marked reduction in this percentage in a few years. None of the doctors were doing tuberculin testing of private patients in 1946. Now, many of them are having their patients examined at the clinic for possible tuberculosis.

Rarely does a patient seek medical care for any cause, and have active tuberculosis overlooked.

* * * * *

# RESULTS OF TWENTY YEARS OF MANTOUX TESTING IN SCHOOLS*

L. S. JORDAN, M.D.**
and
KATHLEEN JORDAN, M.D.***

At the annual meeting of the National Tuberculosis Association, held at Atlanta, Georgia, in 1924, Dr. S. A. Slater of Worthington, Minnesota, gave a paper on the work that he had been doing in rural Minnesota, Mantoux testing school children. The percentage of positive reactors which he found was 10. The current belief at that time was that 90 to 95% of all persons were infected with tubercle bacilli at the age of fifteen years. This percentage was so much lower than that which became accepted as the standard, that it created considerable consternation among the workers in the tuberculosis field, of not only this country, but the world.

The idea began to spread that not all people were infected with tubercle bacilli by the time they reached the "teen" age. The old idea had arisen from data obtained in various surveys in highly populated areas where slum conditions existed, in European cities as well as the large cities on our own eastern seabaord.

During this same period the veterinarians were working throughout the United States with tremendous vigor, trying to eradicate tuberculosis from our dairy herds. By 1930 the accomplishment of the veterinarians had been so outstanding, that the eradication of tuberculosis among cattle in large areas had been accomplished. Inspired by these accomplishments it was decided to use the tuberculin test, in modified program at the Riverside Sanatorium District in Minnesota.

This district covers an area of 3,800 square miles and is located in the South Central and Western part of the state. It is composed of four large counties, Chippewa, Yellow Medicine, Lac qui Parle and Renville. It had 27 small cities and towns and approximately 265 rural schools at that time. The tuberculosis control program instituted in 1930 was commenced with the eight following aims:

1. To discover the infected children, so they could be observed

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throughout their school career and on into adulthood.

2. To trace wherever possible the source of infection for each child found to be a tuberculin reactor.

3. To eliminate the infective factor, by breaking the contact with the child, preferably by institutionalizing the persons with positive sputum or otherwise controlling their disease.

4. To test all adult contacts of the children in the schools including teachers, janitors, bus drivers, cooks, office help, etc.

5. To institute a follow up program, checking each tuberculin reactor by x-ray films of the chest at least once each year or oftener if indicated.

6. To institute an educational program including talks, movies, literature, etc., to reach all lay groups and civic organizations.

7. To obtain 100 per cent cooperation of the state and local medical societies.

8. To aid the veterinarians' program of eradication of tuberculosis among animals, particularly cattle, so no humans would be infected with the bovine type of tubercle bacilli.

With this eight point program in mind as a guide, we started our work. An extensive educational program was begun to gain the cooperation of school boards, organizations such as Rotary, Kiwanis, Lions, Commercial Clubs, American Legion, Veterans of Foreign Wars, Parent-Teachers Organizations, 4-H Clubs, Farm groups, etc. With the backing of these organizations and a ruling by our Attorney General, Harry H. Peterson, "that the Mantoux skin test for teachers and other school employees is a reasonable exercise of police powers of the School Boards, if required for the purpose of safeguarding the health of the pupils of public schools"; our Mantoux surveys were instituted.

School boards could legally require all employees, including teachers, to prove themselves safe to act as guardians of our children during the school hours. Each child was given a blank form to be signed by the parent or guardian, giving consent for the administration of the Mantoux eest, and if a reaction occurred an x-ray film of the chest. No test was done without written permission. At the same time it was explained, that it would be necessary to x-ray all reactors, and that if the individual were able to pay, a fee, $1.00 would be charged to cover partially the cost of the work. The additional cost of the entire examination was derived from Christmas seal money. For persons unable to pay, the entire expense was borne by this fund. All reactors were

x-rayed regardless of their ability to pay. Care was taken to explain that the $1.00 did not cover the cost of the work and materials, and that the balance was provided by Christmas seal money and the sanatorium.

Our goal was high even in the early days of the program. We established the rule, that the children of no school would be tested unless consent blanks were returned by a minimum of 80 per cent of the pupils. This, placed the responsibility of the testing program on each community where the work was to be done. Parent-teacher groups, worked hard to obtain the 80 per cent consents. A spirit of rivalry developed between various towns and schools, which practically always assured the success of the program. Every effort was made to retest the schools each two years. Saranac Lake Old Tuberculin 1/1000 strength was used in all our tests. Comparisons of Old Tuberculin 1:1000 and PPD were used on certain occasions during the years, as were readings at 48, 72, and 96 hours intervals. As a result of our observations, it was decided, that a 72 hour reading is for general purposes in all probability somewhat more accurate than the 48 hour interval, owing to the fact, that it detects some of the so-called "delayed reactors" as well as eliminates the possibility of interpreting small areas of erythema due to trauma, etc., as tuberculin reactions.

In every instance, diligent search was made to determine where the reactors received the infection. Here our field nurse and the knowledge of the family physicians proved of great value. In many instances, the source of infection was found in a grandparent, an uncle, an aunt, hired man, etc., who had unsuspected and undiagnosed infectious tuberculosis. During the first several years that this program was conducted in schools, we found one bus driver, one secretary and twelve teachers with demonstrable pulmonary tuberculosis, of which ten had positive sputa. In one room in one of our larger schools, 42.6 per cent of the pupils reacted to the Mantoux test. The teacher reacted and the x-ray film of the chest revealed evidence of disease which was proved to be far advanced "B" pulmonary tuberculosis. This teacher died in a sanatorium within sixty days of discovery. Of the pupils who reacted to tuberculin in his room, two developed demonstrable active pulmonary tuberculosis within a year.

Each teacher and school employee found to be a menace in so far as tuberculosis infection is concerned, was removed from contact with the children. This work went on yearly with pleasing results. Over 75,000 children were tested and the percentage of

tuberculin reactors found in the same schools decreased as the years passed.

The first several years of this testing survey 1930 to 1934, showed us that 13.9% of our school children were reactors to the Mantoux test. This percentage has dropped so that in 1949 to 1950 we have only 1.1% positive in the rural and 3.6% positive in the urban schools. The following table shows the percentages in the same urban school picked at random between the first years of testing and the most recent.

| 1950 Urban School Results | Riverside Sanatorium District | |
|---|---|---|
| | *Year* | *Per Cent Reactors* |
| Clara City Public | 1935 | 11.6 |
| | 1950 | 3. |
| Clara City Parochial | 1934 | 30.5 |
| | 1950 | 3.6 |
| Maynard | 1935 | 16.8 |
| | 1950 | 1.3 |
| Boyd | 1931 | 15.6 |
| | 1950 | 1.4 |
| Bird Island Parochial | 1931 | 25.7 |
| | 1950 | 3.7 |
| Bellingham | 1935 | 7.7 |
| | 1950 | 1.3 |
| Fairfax Parochial | 1934 | 6.9 |
| | 1950 | 1.9 |
| Fairfax Public | 1934 | 21.3 |
| | 1950 | 2.2 |
| Milan | 1930 | 18.6 |
| | 1950 | 2.8 |
| Olivia Parochial | 1934 | 14.4 |
| | 1950 | 2.1 |
| Olivia Public | 1934 | 11.5 |
| | 1950 | 4.1 |
| Madison Public | 1936 | 14.1 |
| | 1950 | 3.6 |
| Madison Parochial | 1934 | 8.1 |
| | 1950 | 1.1 |
| Granite Falls | 1931 | 9.33 |
| | 1950 | 4.7 |
| Echo | 1931 | 10.8 |
| | 1950 | 3.1 |
| Marietta | 1931 | 17.9 |
| | 1950 | 2.4 |
| Hanley Falls | 1932 | 11.7 |
| | 1950 | 1.9 |
| Clarkfield | 1933 | 9.2 |
| | 1950 | 3.2 |
| Morton | 1934 | 13.3 |
| | 1950 | 3.6 |
| Franklin | 1934 | 12.2 |
| | 1950 | 3.2 |
| Montevideo | 1933 | 13.27 |
| | 1950 | 4.0 |

1950 *Summary of Urban Schools*

| | |
|---|---|
| Total Enrollment | 10,976 |
| Total Number Tested | 10,519 |
| Total Per Cent Tested | 95.8 |
| Total Number Reactors | 386 |
| Total Per Cent Reactors | 3.6 |

1949 *Summary of Rural Schools (four counties)*

| | |
|---|---|
| Total Enrollment | 3,525 |
| Total Number Tested | 3,231 |
| Total Per Cent Tested | 91.6 |
| Total Number of Reactors | 36 |
| Total Per Cent Reactors | 1.1 |

1949-1950 *Summary*

| | |
|---|---|
| Total No. of schools tested | 216 |
| Total No. of schools tested 100 per cent of enrollment | 151 |
| Total No. of schools tested 100 per cent *no reactors found* | 128 |
| Total No. of schools in which *no reactors were found* (Not all 100 per cent tested) | 152 |

We feel from experience that most of our cases of pulmonary tuberculosis in the years to come, will develop among the group of children who are reactors to tuberculin today. Therefore, we believe that not only control, but eradication of tuberculosis can be accomplished by the foregoing program. It is a matter of starting at the "grass roots" to eliminate tuberculosis. In other words, begin with the child to find the infection, then discover its source. Eliminate the fountain head of tubercle bacilli, either by controlling the disease or by hospitalization. Carefully watch the infected children; make x-ray film inspection of their chests annually as they approach and continue in adulthood. If x-ray shadows appear, complete the examination for tuberculosis.

The weapons are now in our hands; they must be used with arduous work, to eliminate tuberculosis. The main weapons are the Mantoux test, the x-ray, the field nurse, and the family physician. Alone, no one of them is adequate. They must be used together to conquer this scourge of mankind. In areas where there is a low incidence of tuberculosis, we feel that the tuberculin testing survey should always come first, the x-ray inspection of the chest can then be limited to the reactors and their contacts, rather than a mass x-ray program, if economy has to be considered.

When a tuberculin reaction is present, two important facts are immediately established.

1. The individual is at least a potential case of clinical tuberculosis.

2. There has been a source of infection which may be sought and often found among the individual's adult contacts in daily life.

The simple fact, that a person reacts to tuberculin, immediately arouses in him or her an intense interest in tuberculosis, and he desires information concerning the ultimate outcome of this infection. The logic of periodic examinations, including x-ray film inspection of the chest, comes to be obvious to them, and their cooperation is easily gained. On the other hand, if only x-ray film inspection is made as is practiced in mass x-ray surveys, and the findings are reported as normal, it is often exceedingly difficult to maintain that individual's interest in subsequent periodic examinations, which may often be indicated. A tuberculin reaction gives us a definite hold on the individual and affords the knowledge that he or she has been infected. This knowledge alone in most cases assures us of full cooperation thereafter. To us it seems far more important to concentrate our attention on the tuberculin reactors where potential clinical tuberculosis exists, than to devote time, energy and money to making x-ray inspections of the tremendously high number in whom there is no possibility of finding clinical tuberculosis.

We believe that tuberculosis in rural Minnesota can be eradicated by this method. We also feel that it would be a tragedy to introduce BCG in an area such as ours. To establish artificially sensitivity of the tissues of all of our citizens would be to destroy our most potent weapon — the tuberculin test. It must be remembered, that in order to develop clinical tuberculosis, infection must first occur. If we eliminate the sources of infection, and carefully watch those few whose tuberculin test show that they have been infected, we have every reason to believe that in our entire state tuberculosis will be relegated to the same category as typhoid fever and smallpox within the life span of the coming generation.

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# TUBERCULOSIS CONTROL AND TEACHING TUBERCULOSIS IN SCHOOLS*

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DR. R. H. RUNDE,
*Medical Director*
*Peoria County Tuberculosis Sanatorium District*

In discussing the subject, Tuberculosis Control and Teaching Tuberculosis in Schools, we would like to tell something about what is being done in our own community, Peoria, and to suggest what should be the minimum requirements for a satisfactory tuberculosis school program.

*Tuberculosis Control,*—Solving the tuberculosis problem in schools is only one of the many control measures to be used in every community. Other things, such as furnishing adequate treatment and clinic facilities, x-ray surveys, proper isolation of the contagious, public health education, and rehabilitation of ex-patients, are all important items. None of these procedures should be over-emphasized at the expense of the others.

The most important single measure in tuberculosis control in schools, which should always be carried out in every community, is a requirement by the School Board that all school employees, teachers, — janitors, office workers and others, — should furnish proof annually that they are free from contagious tuberculosis. This proof should be in the form of a negative tuberculin test or a normal chest x-ray film. The health authorities in the community should make it possible for the school employees to have these procedures done at no cost to them, but there should be no objection to the employee's furnishing this proof through a private physician. This school board requirement has been in effect in Peoria for eight years. During this time 7,213 school employees have been examined and 21 significant cases of tuberculosis have been discovered — three of them active. Although the number of cases discovered has not been too alarming, the resulting satisfaction made possible by this procedure in assuring the parents that their children will not be unnecessarily exposed to tuberculosis in the schools would be reward enough. There can be no legitimate excuse for not adopting this regulation in every community.

* Read before the American School Health Association, St. Louis, Oct. 30, 1950.

Another suggested procedure which is recommended, but which to date has not been very effectively carried out in Peoria, is the tuberculin testing of all pre-school children, preferably at the time of their pre-school clinical examination. Few cases of active tuberculosis will be discovered in the pre-school children themselves. If the tuberculin reactors are reported to the proper tuberculosis authorities or to the private physicians, and a careful check-up is made of the family and close contacts, it will be possible to discover in a high percentage the active case of tuberculosis which was responsible for infecting the child. This is an important case-finding procedure. It is also quite beneficial to the child himself, as it will make possible the termination of the contact and thus increase his chance of remaining healthy. Because of the age of pre-school children, those with tuberculin reactions have undoubtedly received their infection as a result of recent contact with active cases of tuberculosis. Since children do not have as much opportunity to roam about the community as older people, the active case is very likely to be found in their own family or home.

Carrying out a tuberculin testing program in pre-school children can be rather difficult. An effective program in these individuals means that there must be a very effective and well organized program for clinical examination of pre-school children. If the clinical examination is haphazard, is drawn out over a long period of time, or is never completely finished, as in many communities, then a testing program will not be very successful. For this reason some communities have found that better results can be obtained if tuberculin testing is postponed until the child's entrance into the first grade.

In considering tuberculin testing of school children, the authors believe that every community should have some sort of school testing program. Whom to test and how often will vary in each community. A tuberculin test given to each student every year of his school life might be the ideal situation; however, this procedure can be impractical especially in larger communities. In the city of Peoria there is an annual program which offers tuberculin testing on a voluntary basis to sophomores and seniors of all the high schools. In the county high schools it has been the practice of offering the test to all students every year. Since 1940 when tuberculin testing was first started both in Peoria county and city high schools, there have been 22,710 students tested. One thousand, five hundred forty-two reactors have been found. All

of the reactors were x-rayed and 16 cases of active tuberculosis discovered. The present status of these 16 cases is as follows:

10 are arrested and leading normal lives
3 have died of tuberculosis
3 are ill and still under treatment for their disease

Considerable work is done in regard to giving publicity to the tuberculin testing program before each annual survey. Participation is entirely voluntary and the percentage of participation has gradually increased annually until last year over 95% of all seniors and sophomores in the city were given the test. The annual percentage of reactors in the city and county has gradually fallen since 1940.

We do not test students in grammar schools as a routine procedure. Occasionally an entire school is tested when an active case, either in one of the students or school employees, is discovered in some other manner. When the grammar school students are tested, then it is important to remember that the close contacts of all reactors should be investigated to see if unknown contagious tuberculosis can be discovered. By the time the student reaches high school he has had ample opportunity for multiple contacts throughout the community. Even then, however, it is our practice to test or x-ray all close contacts of reactors.

The benefits of the tuberculin testing programs in schools are as follows:

First, as an educational procedure. A student participating in the tuberculin testing program has an incentive to learn something about tuberculosis and the meaning of the tuberculin test, especially if he is made to feel that he is part of the program.

Second, it has some merit as a case-finding method. In young children one can find unsuspected tuberculosis in a check-up of contacts of the reactors. In older children an x-ray check-up of all reactors will produce a few cases of insidious significant tuberculosis.

Third, the percentage of reactors can be a rough estimate of the number of active cases of contagious tuberculosis roaming around the community. In other words, it is a measure of opportunity for infection. If annual percentages of reactors are compared, some information as to the efficiency of the tuberculosis control program in that community is obtained. A definite decline in reactors indicates that tuberculosis control is effective, while a sharp rise means something is wrong.

Fourth, a record of a positive or negative reaction could be

of some value in establishing a diagnosis later in life.

Fifth, a final but quite important advantage of routine testing of children is that it points out a group of individuals who should be under observation and have the protection of an annual chest x-ray film inspection for a considerable time to come.

Something should be said about tuberculosis control in the schools and universities above the high school level. Here case-finding becomes more important because the age groups involved are much more likely to have clinical disease. At Bradley University, located in Peoria, which has an approximate enrollment of 3,500 students, one of the requirements for registration is a chest x-ray film during registration week, which is the beginning of each school year. This is made possible through the cooperation of the State Board of Health, which furnishes a portable x-ray unit that is set up in the large field house where registration takes place. On large billboard-size signs a chest x-ray film is listed among the many requirements of registration.

During the past four years 13,823 chest x-ray films have been taken at Bradley University. The results are as follows: *Six* cases of unknown active tuberculosis have been discovered. All of these have had treatment. At present *four* are classified as arrested, three of whom are back in school; one is still under treatment in the Sanitarium, and one entered a Veteran's hospital outside of the city and his present status is unknown. *Sixteen* cases have been placed under observation. Some of them proved to have conditions as non-tuberculous pneumonitis, pleurisy, etc. These have been referred to family physicians for disposition. Eight of these cases are still under observation as their work-up is not yet complete. *Eighteen* cases have been classified as arrested tuberculosis, and have been referred to the proper channels for check-up examinations.

The procedure of annually x-raying college students is rather simple. It takes little time and, with the aid of the County Tuberculosis Association and voluntary workers, is not too expensive. Many schools and universities use the tuberculin test either with or without x-ray film. We prefer to use the test only in those indicated cases after the x-ray film has been taken.

In summary, the minimum requirements for an effective tuberculosis control program in schools should be:

1. A NORMAL CHEST X-RAY FILM OR NEGATIVE TUBERCULIN TEST SHOULD BE REQUIRED OF ALL SCHOOL EMPLOYEES ANNUALLY.

2. TUBERCULIN TESTING AND FOLLOW-UP OF CONTACTS OF POSITIVE REACTORS OF ALL PRE-SCHOOL CHILDREN OR FIRST GRADERS.

3. SOME FORM OF TUBERCULIN TESTING PROGRAM IN THE SCHOOLS, PREFERABLY IN THE HIGH SCHOOLS, SHOULD BE CARRIED OUT.

4. ANNUAL CHEST X-RAY FILMS SHOULD BE MADE ONE OF THE REQUIREMENTS FOR REGISTRATION IN ALL COLLEGES AND UNIVERSITIES.

*Teaching Tuberculosis,*—In discussing the teaching of health, including tuberculosis, in schools our first consideration must be the teachers themselves. Teachers are looked upon as educated individuals in their communities, educated not only in the three "R's", but in many other things, including health problems. We wonder if even the teachers realize their own importance, how they are looked upon by their students. The attitude of the teacher is frequently carried back into the home through the students. In other words, this is very frequently reflected in the attitude of a community on certain things. For example, on more than one occasion we have participated in tuberculin testing programs in certain schools, and the program turned out to be a complete failure. Excellent talks were arranged for the student body explaining the test and its purpose. This was followed by an appropriate movie, or a question and answer period. Enthusiasm and interest seemed to assure a successful testing program. Then a few closing remarks by a teacher or principal: "It will be all right to take the test, that is if your parents want you to. As has been said, the shots will be given Monday, so those who want this vaccination should return their consent cards to me." The result, very few students were tested, and an entire community denied a valuable public health service, because of one teacher's attitude.

On the other hand we have participated in these programs where the school personnel initiated and organized the program. Needless to say, these were invariably successes. As time goes on, we are more convinced than ever that the place to begin teaching of health in schools, is with the teachers. We have felt for a long time that the teaching of health in schools, including something about tuberculosis is very important. Certainly one of our most precious earthly possessions is a healthy body. Acquisition of wealth and fame are not to be compared with good health; to have vast knowledge concerning many things, and no knowledge concerning preservation of health does not seem consistent. If

the purpose of education is to prepare and train individuals to cope with the problems of living, then certainly information on maintaining good health is a vital part of that training.

For a long time the medical profession has been distressed by the finding of incurable cases, which at one time could have been successfully treated. Prevention and early diagnosis are being stressed. Health education is the most important means of carrying out these campaigns. Prevent mental illness and heart trouble, find tuberculosis and cancer early, are slogans frequently heard. Certainly if health education is important in bringing the incidence of certain diseases to a minimum, then this education must begin early enough in life to have the desired effect. The school is the best avenue for teaching health.

During the past few years we have questioned many students who had graduated recently from various high schools, attempting to determine how much information concerning health and tuberculosis they had acquired. Almost invariably the answers were disappointing. Many students had received no information concerning their most valuable asset—good health. In schools where a good tuberculin testing program had been carried out, students had at least some information about tuberculosis.

It is important that those teachers who do teach health subjects be interested and enthusiastic about the subject; that they do outside reading, and that they keep the students interested. Too frequently the teachers possess no more information than is gathered from the pages assigned to the students to read. They are unable to answer questions unless specifically answered in the text. We have talked to teachers attempting to teach health and they have expressed their feeling of insecurity, because of lack of information. It is the opinion of the authors, that all teachers, especially those who are to teach health subjects, should be required to obtain more information pertaining to health.

Some communities have met with considerable resentment and opposition from teachers when it became a requirement to present evidence that they were free from tuberculosis before they could teach. We are sure such resentment could not have existed had those individuals been in possession of a few facts concerning tuberculosis, and the importance of keeping tuberculosis out of schools.

We would like to repeat — if health education is important it must begin early. Extensive teaching regarding tuberculosis or any other specific disease is not feasible in grammar schools. Gen-

eral rules for good health and hygiene can be taught here and the foundation laid for more specific teaching during the high school years.

In high schools, students should have the opportunity to learn something about tuberculosis and other health problems. Of course, the teaching of tuberculosis should not be over-emphasized at the expense of other health problems, but should be taught along with them. Every text-book dealing with health, hygiene, or allied subjects should contain pertinent facts concerning tuberculosis. The teaching of health should be made a requirement for graduation from high schools, so that all students will be exposed to this information.

The tuberculin testing program offers an excellent opportunity for health education. Proper preparation and follow-up work on a tuberculin testing program can be very effective in teaching tuberculosis, not only to the students, but to the teachers and parents.

Tuberculosis associations can render valuable assistance in the teaching of tuberculosis in connection with the testing program. In larger communities where the association employs a Health Educator, excellent teaching can be done.

In Peoria the tuberculin testing program is carried out through the co-operation of the Peoria Municipal Sanatorium, the Tuberculosis Association, and the Health Department. In the city high schools the sophomores and seniors are tested. The preliminary education is done by the Health Educators of the Tuberculosis Association and the Health Department, under the guidance of the co-operating agencies.

Several plans have been used to convey information on tuberculosis to students and parents.

1. Through selected leading students:
   Students in the advanced biology and speech classes conduct an "Information Please" program. An informal discussion of tuberculosis was held before the entire student body. These students had been previously instructed by the Health Educators, and had been amply supplied with literature and information. This program was well received, and we believe accomplished the desired results.
2. Through the teachers:
   This consisted of meetings with the teachers giving them the necessary information, and they in turn presenting the information to the students in appropriate classes or assembly meetings.

3. Through individuals outside the school:
   Movies and assembly meetings conducted by informed individuals outside the school system.
4. Parents:
   Selected programs for Parent-Teacher meetings. Especially valuable when conducting tuberculin testing programs in grade schools.

What information concerning tuberculosis should be given to high school students? It should be non-technical, and should stress those things which we try to impress upon adult lay groups.

1. Tuberculosis is a catching disease:
   That it is caused by a germ and spreads from one individual to another by contact. That tuberculosis runs in families because of close association, not because it is inherited.
2. Tuberculosis is preventable:
   If every case of tuberculosis was found, and took proper treatment, the disease could not be spread. That all cases of active tuberculosis are dangerous, and may give the disease to others.
3. Tuberculosis is insidious:
   Tuberculosis frequently produces no symptoms at onset. That it may even reach the advanced stage without making the individual very ill. Just because an individual feels well does not mean he is free of tuberculosis. Unsuspected cases are frequently responsible for spreading the disease.
4. Tuberculosis is curable:
   Tuberculosis is not a hopeless disease. Early cases are of course more easily cured than the advanced cases, but even advanced cases can frequently be cured. Climate is not an important factor in the treatment. The important thing is correct treatment as soon as possible. There are no short-cuts in treatment to take the place of the usual sanatorium care.
5. The tuberculin test:
   The nature of the test; the significance of the test; the meaning of the positive and negative result; the importance of periodic retest of negatives; the importance of follow-up x-ray films on positives; the advisibility of tuberculin tests or x-rays on other members of the household of positive reactors.

Education of parents and other adult members of the student's household can also be carried out in conjunction with the school testing programs. In Peoria a letter was sent to all parents asking for their signed permission to give the tuberculin test to the child. Some information concerning tuberculosis is sent with this letter. After the test is completed another letter is sent to all negative reactors. This gives an opportunity to enclose more information, while thanking them for their assistance in the program. The parents of positive reactors not only received a letter, but were contacted, and all adults in the home were advised to be examined for tuberculosis. If the chest x-ray film is normal, another letter is sent explaining something more about tuberculosis.

1. *Summary,*—Health education is most important in the prevention and early diagnosis of tuberculosis and a number of other diseases.
2. Health education must begin early in life if the desired effect is to be obtained. The school is the best avenue for teaching health.
3. All teachers should have more information on health subjects. Those who are to teach these subjects, definitely need more information than they are receiving.
4. A course in health should be a requirement before high school graduation, so that all students will be exposed to some health information.
5. A tuberculin testing program conducted efficiently not only finds unsuspected tuberculosis in school, but offers an excellent opportunity to teach tuberculosis to students, teachers, and parents.

* * * * *

# CAN TUBERCULOSIS BE ERADICATED IN SCHOOL CHILDREN*

By EDWIN R. LEVINE, M.D.
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In the attempt to control tuberculosis, a great deal of attention has been paid to concepts of resistance and predisposition. For a long time it was felt that hereditary factors played a role of much importance, that tuberculosis in the family was evidence of an hereditary susceptibility. Consequently, children from such families received special attention in the hope of preventing this disease, while the others were left pretty much alone. However, the evidence indicated that the increased incidence of tuberculosis in members of infected families was due to contact, not to susceptibility. As time went on, it became clearly demonstrated that heredity as a factor must be discounted entirely. Tuberculosis is a disease caused by the tubercle bacillus, and neither resistance nor susceptibility in man is a function of hereditary mechanisms.

Then there were those who felt that the prevention of tuberculosis was a matter of control of certain racial groups. This was expressed in the belief that a high incidence of infection would be found in certain peoples because of their racial lack of resistance, while in others, who were supposed to have a high resistance, the incidence would be low. Therefore, if the susceptible groups could be controlled, the more resistant groups would take care of themselves. The typical examples used were Negroes for heightened susceptibility opposed to various groups of the white race, who were supposed to show resistance. This gave some people a pleasant feeling of superiority and security to know that they belonged to a race group unlikely to develop tuberculosis.

It has been unfortunate for this feeling of smug contentment that mass x-ray surveys have revealed its fallacy. In such cities as Chicago, where the Negro death rate is high, the incidence of tuberculosis as measured by x-ray films is lower among the Negro than among the white population. In fact, in routine x-ray film admissions to Cook County Hospital, the incidence of tuberculosis among the white group is twice as high as among the Negroes.

Other studies have shown all sorts of variations among members of the same racial groups, depending upon environmental factors. Thus, this comfortable concept of racial susceptibility

* Read before the Annual Meeting of the American School Health Association, at St. Louis, October 30, 1950.

and resistance must be cast into the discard as being untenable in the light of actual evidence.

Another long standing belief that tuberculosis was a disease of children and young people must likewise be discarded, although for years we have felt that youth and young adult life was the time of greatest danger. Present statistics indicate that the largest number of deaths from tuberculosis occur after the age of forty-five. We must, therefore, accept the fact that there is no natural immunity to tuberculosis that may be depended upon to protect us from the acquisition of this disease.

This then brings up the subject of acquired immunity. In the handling of most infections the development of resistance is an important concept. Following the discovery of tubercle bacilli and the recognition of primary and reinfection tuberculosis, it was felt that resistance was also developed to this disease. One of the most generally held beliefs is that "benign infection" early in life will confer a relative immunity on an individual. Consequently, almost from the time of the discovery of the tubercle bacillus, attempts have been made to produce such an immunity by artificially introduced infection, that is to say, by vaccination.

We have been told that just as smallpox and diphtheria have been virtually eliminated by innoculation, tuberculosis may be conquered in a like manner. It is hard to understand how anyone who has had any experience with tuberculosis can make such a statement. Let us compare the diseases. When an individual has recovered from an attack of smallpox, he does not fear a recurrence of the disease. He may be exposed to the infection or his general resistance may be allowed to deteriorate, but to all intents and purposes he is immune to a recurrence of that specific infection. What happens to the patient who has recovered from tuberculosis? Is he immune? Can he go through life without fear of recurrence? Quite the contrary. He is specifically instructed to be careful of his way of life, to maintain his resistance, to have check-ups regularly, or he will most certainly suffer a recurrence of his disease. For tuberculosis not only does not confer immunity, it apparently increases the possibility of subsequent infection. Why then should vaccination be recommended for tuberculosis because it is successful in smallpox?

Another fact should be considered, the basic question of the relative immunity obtained by a "benign" primary infection. Does immunity occur? The concept originated at a time when there was an universal tuberculous infection occurring before adult life.

The concept arose out of animal experiments, since the very high incidence and death rate during this period would hardly bear out a state of resistance. Today, when both the death rate and the incidence of infection is sufficiently low to permit of some comparative studies, some very definite facts are developed.

In those areas where the incidence of primary infection is low in individuals reaching adulthood, there is likewise less tuberculosis. In large cities, those groups of the population where the percentage of positive tuberculin tests are highest have most of the tuberculosis, while those groups with the low rates have less tuberculosis. An objection has been raised that this would be true only when these tuberculin negative people remain in their tuberculin negative communities. In fact, such statements as those made by Mayer and Rappaport in 1942 have been accepted without question. "Contact is always dangerous to tuberculin negative adults because there are presumably coming from a non-tuberculized environment. It has been a long established fact that boys and girls that come from less tuberculized rural sections and become overly exposed in a tuberculized area die of the disease." It was further stated that because of lack of previous contact "more of our young adults now develop progressive lesions from their contact infections." They predicted at this time of mobilization of armed forces that there would be a high rate of tuberculosis in the services because "large numbers of youths from an environment of relative low levels of tuberculization would be suddenly thrown into the environment of a comparative high level of tuberculization."

This is a currently accepted belief, but what actually happened? In the armed forces, where large numbers of tuberculin negative young men and women were exposed not only to the danger of large urban centers in the United States, but to the very much higher levels of tuberculosis in England, Scotland, Italy, Africa, India, etc., we find the tuberculosis rate to be about 0.3 per cent. This is hardly an epidemic nor the large amount of progressive tuberculosis that had been predicted under such circumstances.

Furthermore, during the same period in which the level of primary infections measured by the tuberculin test has decreased so markedly (1930-1948), we find that the death rate in young people between fifteen and twenty-four has decreased by more than 80 per cent and between twenty-five and thirty-four the decrease has been about 75 per cent. These facts cast considerable

doubt upon the "immunity" conferred by a primary infection, and cast further doubt on the theory that the lack of such a previous infection is likely to produce an increased rate of malignant tuberculosis. In fact, when we examine our present-day figures not only as regards the high death rate over the age of forty-five, but the high incidence rate during those years, we realize that all of those people were in the tuberculin positive group. In reviewing the x-rays in a mass survey, it is noted that the majority of lesions found in this older age group are not the massive fibrotic or cavitary disease that might have existed for many years, but the same minimal lesions that we have been finding in younger people. The conclusion is inescapable. These are not recently acquired lesions. If they were, why should not younger people show as many or more of them? These are the manifestations of infection which have been acquired in childhood or adolescence, the "benign" primary infection once thought advantageous, which is only now becoming clinically evident.

If we look at these facts without the bias of preconceived and oft repeated ideas, we are not likely to come to the conclusion that a primary infection confers immunity, but rather conclude that tuberculosis is only found in those groups which show this previous infection. In the light of this, it is hard to understand the enthusiasm expressed in some quarters for a program for producing such primary infections artificially by vaccination.

This is even more difficult to comprehend in the light of history. BCG, the vaccine now being exploited, is only one of a long series of such vaccines starting before the turn of the century. There has been enthusiasm for all of them. Somehow, despite the similarity of claims for each of these vaccines, one by one they have disappeared from public notice and from scientific recognition, only to be followed by another very similar product. Either the desire for a vaccine is very great, or we are hard to convince.

Let us see how efficacious the current favorite, BCG vaccine, is. We are told that this is a well established vaccine, but actually what is it? No two investigators anywhere in the world, in the group that has been working on it since 1925, can agree on any fundamental facts, such as the proper method of producing this vaccine, how to measure its activity, how many organisms should be given to a dose or even how to determine how many are present in a dose, what are the proper methods of vaccination, how to determine whether immunity occurs or how much immunity may

be measured, what is the demonstration of the effectiveness of this vaccine, what is the effect of revaccination, and many other facts. The absence of any agreement on any of these fundamental propositions indicates that after more than twenty-five years we are still dealing with an experimental product.

How about the results? The literature has been flooded by papers purporting to report on more or less scientific investigations of the effectiveness of this vaccine. Can these be accepted as proof of the effectiveness of the substance? Carroll E. Palmer, in his report to the World Health Organization stated, "First, it must be admitted in clear and unequivocal terms that strict scientific proof of the effectiveness of BCG vaccination in the control of human tuberculosis is not available."

If the investigators' studies cannot be relied upon, what has been its effect as a public health measure in those areas of the world where it has been used most freely? We have heard much about the wonderful result of vaccination in Scandinavia. What are the facts? In Sweden vaccination has been practiced extensively since 1928. This is a country which has none of the problems which create a high tuberculosis incidence. There is no problem of mixed races which include large numbers of the colored races whose death rate is so high. There are none of the massed industrial and slum areas which are found in so many of the cities of the United States. Standards of living, average death rates, infant and maternal mortality, and hospitalization — all rank with the best in the world. Consequently, we would anticipate a low death rate from tuberculosis, and if BCG vaccination is indeed effective, it would be much lower than the United States death rate.

The facts are that the tuberculosis death rate in Sweden has remained high, very much higher than that of the United States. In Denmark, which has a lower tuberculosis death rate, we find that the rate was dropping much more rapidly before the extensive use of BCG vaccine in 1940. Following this we find a flattening out of the death rate with no particular change for the next five years, and only after that does the rate begin to decline as it should have some years before. This cannot be blamed on the war, since it is reported by Johannes Holm that there has been a rise in living standards and improvement of everyday hygiene, and furthermore, that the diet of the population is adequate and that there was no nutritional change related to the second world war.

Let us compare these facts with those of Iceland, where BCG has not been used. We find that from a figure of 200 per 100,000 in 1930, the death rate has decreased to 34 in 1948, a decrease unmatched in any of the BCG countries. We are told that the decrease in tuberculosis mortality in children in some of these countries is due to BCG, but in the United States the decrease of this death rate in children over the age of fourteen, has been about 80 per cent for both white and non-white children without the use of vaccine. It would appear that, despite the claims of the great effectiveness of BCG, the actual facts indicate that it has not demonstrated any noticeable degree of control of tuberculosis in any area, where it has been used on a large scale.

We are told, however, that since the exponents of this vaccine say that it is completely safe it should be used as a method of adding something to our present control methods. Let us examine this constantly repeated claim of the complete safety of BCG vaccine. What is it based upon? It is said that millions of people have been vaccinated and that no proved cases of tuberculosis due to the vaccination have occurred. This is a sweeping statement, but can it be made? The vaccinated persons have been followed so poorly that no scientific conclusion can be drawn from the studies. Furthermore, we know that infection occurring in children may not show sufficiently to be determined clinically until after twenty or twenty-five years have passed; in fact, in light of present-day observations, not until forty or more years have passed. Despite this knowledge common to all people working in tuberculosis, definite claims are made after following a portion of groups of children for a few years. It will be necessary to follow a single group for more than twenty-five years before any such statement can be made.

H. J. Ustvedt, deputy director of the Joint BCG Commission of the World Health Organization, states that the question of the possibility of BCG producing or activating a tuberculous lesion has not been definitely settled. Certain facts appearing in various parts of the world raise serious questions as to the safety of BCG vaccine. The experience in the Finnish army where tuberculin negative recruits were vaccinated is one of these. That vaccinated army showed 2.6 per cent tuberculosis compared with the 0.3 per cent of the American forces.

Furthermore, the experience in Brazil where vaccination of newborn babies has been compulsory since 1945 raises the same question. Here we find in Rio de Janeiro that the general tubercu-

losis death rate from 1945 through 1948, decreased from 342 to 242, a decrease of 29.2 per cent. This is apparently proof of the efficacy of the vaccination. But on examination the figures show that the group that was not being vaccinated—the adults—were responsible for all of the decrease. The newborn babies who were receiving BCG showed an increase in tuberculosis with a death rate, in the birth to one year group, of 41.3 per cent; in the one to two year an increase of 62.5 percent, and in the two to five year group, some of whom were out of the range of vaccination, the increased tuberculosis death rate was only 15.9 per cent. Such figures raise serious doubt of the safety of injecting live tubercle bacilli into the bodies of human beings.

There is some experimental evidence that definitely establishes the fact that the tubercle bacilli in this BCG vaccine may not remain harmless. Vorwald has recently shown that the BCG organisms injected into guinea pigs, who have previously been exposed to quartz dust, showed an increased virulence, as demonstrated by a spreading and fatal disease. The same organisms isolated from the fatally infected guinea pigs proved to be the ordinary BCG organisms when tested on normal animals. Other work has shown enhancement of virulence in animals whose diet was deficient. It is thus demonstrated that the "benign" organisms become virulent in these two above mentioned instances. Is it reasonable to assume that there may be other factors which may have a like effect?

From this experimental work and from the observed results mentioned above, the oft repeated statement of the complete safety of BCG vaccination would seem to be a matter that has been accepted on faith, rather than on evidence.

It would seem that the most cursory examination of the facts as they actually exist, that the hope of eliminating tuberculosis by vaccination is a vain one. It would seem that we are likely to increase the disease rather than eradicate it, if we vaccinate large masses of children. The veterinarians in their program of animal control discovered this many years ago, and gave up BCG vaccination as a control measure. It would appear strange on the face of this evidence that we should be asked to inject into children a substance that we do not consider desirable to give to pigs and calves.

If we review the various factors that are supposed to produce immunity from tuberculosis infection, we discover that there is only one sure method, the absence of the tubercle bacilli. There

is no safety nor any form of protection in any country where tuberculosis infection exists. The less tuberculous infection that occurs, the less clinical tuberculosis is found, and the lower the death rate becomes. This is the only certain and sure thing that we know about the prevention of this disease. With the improvement in living conditions, the increase in health education and general hygiene, with the extension of our methods of finding tuberculous infection and prevention in the individual and in the community, we are making amazing progress towards the complete eradication of this diseasee. It does not seem logical that we should diminish our efforts along lines that have proved successful and take up any procedure whose value has not been completely demonstrated. It is even less logical to propose indiscriminate vaccination as a method of protecting our children when the vaccine is in an experimental stage and has not been proved effective and not been proved safe, particularly in the light of the amazing improvement in tuberculosis control that has occurred in children in this country. We have eliminated typhus, cholera, and bubonic plague, by wiping out the source of infection, not by that infection continuing at a low level. The eradication of tuberculosis in school children can only occur when we have eradicated the disease in our communities by the elimination of infection. This is the only certain immunity to tuberculosis, the absence of tubercle bacilli.

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## EDITORIAL

**The Committee On Tuberculosis** of the American School Health Association was appointed by President Charles H. Keene in 1934. In the 16 years that have elapsed, Dr. Keene has fathered this committee. From the outset the aim of the committee has been to eradicate tuberculosis from the schools of America. It was particularly fitting that its first meeting was held in the former home of Dr. E. L. Trudeau at Saranac Lake, New York, in 1935. It was in this village that Dr. Trudeau penned the Address of the President, which he presented in Washington at the first annual meeting of the National Association for the Study and Prevention of Tuberculosis (later, National Tuberculosis Association). In this famous address, Dr. Trudeau emphasized the great importance of education in stamping out tuberculosis. He said: "The first and greatest need is education; education of the people and through them education of the state." He said, "Education should begin by teaching in the public schools the main facts relating to the transmission of tuberculosis, insisting in such teachings on the value of hygienic measures of prevention . . ." Dr. Trudeau's statements concerning education in the schools are just as true and important in 1950 as they were in 1905.

The schools afford our best educational opportunity in combating tuberculosis. In this country there are approximately

45,000,000 children, of whom 34,700,000 are of grade and high school ages. There are approximately 1,000,000 teachers. The best educational work comes from actual participation in a tuberculosis control program. To introduce and perpetuate such a program in the schools in which teachers and other members of personnel and the children participate is the best form of education. Members of personnel and children who have the tuberculin test administered periodically as indicated, and are informed or told of the information obtained from the test, gain an understanding which is not obtainable in any other way. Tuberculin reactors who have periodic examinations, including x-ray inspection of the chest, learn what cannot be obtained from lectures and books. When children who have participated in a tuberculosis control program in school enter adulthood, they are highly qualified to assume the responsibility of tuberculosis control programs in their communities.

Teachers wield a tremendous influence, not only over the children, but also over the adults of their communities. Through participation in the tuberculosis control program in the school, they obtain information which their very profession compels them to transmit to others.

A few years ago, tuberculosis control programs in many schools were reduced to mere shadows of their former selves or entirely abandoned because of the teaching that most clinical tubercolosis is found in adults and therefore all effort should be directed against disease in adults. The fact was overlooked or ignored, that the normal appearing child who reacts to tuberculin today may be the contagious adult consumptive of tomorrow, if the source of his infection is not found and broken and he, himself, is not kept under close surveillance. The fact was also overlooked that neglect to inform the children of today concerning tuberculosis means an adult population ignorant in this regard tomorrow. A national problem whose solution requires decades is best solved by familiarizing the children with it and having them begin to participate in its solution at the earliest possible age. This applies especially to the nation's health. No tuberculosis control program in any community, state or nation can be considered of the first class unless it reaches every school child and every member of the school personnel periodically.

From its very first meeting, the Committee on Tuberculosis of the American School Health Association has visualized an American school system free from tuberculosis. The problem in the

schools has been carefully studied and various methods designed to control tuberculosis in many parts of the world, have been given careful consideration. After all, the chief interest of the members of the committee has been in attaining the eradication goal, and adopting the method by which this goal can be reached with certainty in the shortest possible time.

When we were asked to prepare a program on tuberculosis for the 16th Annual Meeting of the American School Health Association to be held in St. Louis on October 30, 1950, it was decided that each speaker should be endowed with vast and long experience and outstanding accomplishments in controlling tuberculosis in the schools. From this decision came the fine array of papers appearing in this January issue of *The Journal of School Health.* The authors have not discussed theoretical considerations. They have shot straight at the mark—the tubercle bacillus. There has been no intimation whatsoever of appeasement. Desruction and ultimate eradication of the tubercle bacillus has been the only consideration. The accomplishments of these authors has thus far surpassed those anywhere in the world who have used different methods. They have established a sound fundamental method, in operation long enough and extensively enough to prove its efficaciousness beyond doubt. It is a method that can be employed anywhere in the world where the people really have the will, the tenacity and ability to solve their tuberculosis problems. This fine array of papers in pamphlet form should be widely disseminated for they point the way to eradication of tuberculosis everywhere.

Jay Arthur Myers, M.D., Chairman.

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**Dr. Myers Named Dearholt Medalist,**—Dr. J. Arthur Myers, Minneapolis, was named the recipient of the 1950 Dearholt Medal, given annually by the Mississippi Valley Conference on Tuberculosis for outstanding contributions to tuberculosis control. Dr. Myers is a past president of the National Tuberculosis Association, chief of the University of Minnesota Chest Clinic, and a former member of the editorial board of the American Review of Tuberculosis, publication of the American Trudeau Society. He has written a history of anti-tuberculosis work in Minnesota.

Ever since the committee was organized, Dr. Myers has been chairman of the Committee on Tuberculosis of the American School Health Association.

## ABSTRACTS AND NOTES

**Accident Prevention in Childhood,**—Dr. Dietrich, in a contribution to this issue of *The Journal** (page 1175), calls attention to the brilliant accomplishments in the last half-century in the fields of public health and preventive medicine with resulting dramatic reduction in the mortality and morbidity of most infectious diseases and to the contrasting essentially unchanged death rate from accidents. The situation reflects lack of information on the part of the laity and some apathy on the part of the medical profession. The lack of interest in the subject is the result not so much of inadequate information as of insufficient emphasis.

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According to Dr. Dietrich the problems of poliomyelitis, heart disease, cancer, and tuberculosis in children are dwarfed by the physical and emotional devastation brought by juvenile accidents. In one year 12,500 children were killed by accidents. The number of children who were permanently crippled is not known, but Dr. Dietrich would place it at about 50,000 annually.

Dr. Wheatley[1] states that not only do accidents kill more children after infancy than does any single disease, but, in the ages from 1 to 14 inclusive, accidents take as many lives as pneumonia, diarrhea and enteritis, measles, diphtheria, meningitis, poliomyelitis, whooping cough and scarlet fever combined. According to Clark,[2] the important causes of death due to diseases in the United States in the 1 to 14 year groups are pneumonia, congenital malformations, tuberculosis, heart disease, and cancer. How-

* Journal A.M.A.

1. Wheatley, G. M.: Editorial: Child Accident Reduction: A Challenge to the Pediatrician, Pediatrics 2:367 (Sept.) 1948.

2. Clark, E. B.: Leading Causes of Childhood Death, California Med. 73:22 (July) 1950.

ever, in numerical importance, all these rank far below death from accidents. To cite one example, Dr. Clark states that the death rate from diphtheria for all ages has been reduced from 40.3 per 100,000 population in 1900 to 0.6 per 100,000 in 1947. In this same interval the death rate from accidents has fallen only from 72.3 in 1900 to 69.4 in 1947.

Recent contributions to the subject emphasize that accidents do not happen but are caused, and since they are caused, they can be prevented. Dr. Dietrich introduces a new idea into the subject of accident prevention in children. This theory emphasizes the reciprocal relation of protection and education related to a child's age. Prevention of a particular type of accident must employ varying protective and educational pressures at different ages. During the first year of life the prevention is protection: the infant should not be dropped or allowed to fall. The protection must be 100 per cent. As soon as the infant becomes ambulant, the problem is more complicated. Here one must add to protection education against accident. The ultimate mediators of any accident prevention program in childhood are the parents. Children past the age of 1 year should be exposed to the educational value of minor painful experiences. The 1 to 5 year age period is the critical one so far as death and crippling are concerned.

A certain amount of discipline, Dietrich emphasizes, is valuable in the educational aspect of accident prevention. Discipline should play an important role not only in accident prevention, but in character building of a child by enabling him to obtain a sense of security.

All workers in the field of prevention of accidents to children, emphasize that the responsibility for the distribution of information to parents, rest primarily on the medical profession. Specific information on the subject of accident prevention in children can be obtained from booklets published by several of the leading insurance companies. The importance of the problem was reflected in the discussions of the recent meeting in Chicago of the American Academy of Pediatrics. Dr. George M. Wheatley of New York, was appointed to head a new committee that will attempt to reduce the number of accidents among the children of our nation. In the final analysis, it is the general practitioner who can contribute most to this subject, for it is he who should advise the parents on all matters pertaining to the health and safety of children. Abstracted from Editorial, Journal of the A.M.A., Dec. 2, 1950, p. 1183.

**Basketball Following Rheumatic Fever.**—To the Editor: — Should a high school boy who has had rheumatic fever be allowed to play basketball three months after an attack, provided there is no evidence of cardiac disease? The rheumatic fever involved the right knee joint and one metacarpophalangeal joint of the left hand. There was only moderate fever during the three weeks' course of the disease.—*M. D.*, Minnesota.

ANSWER:—One of the most difficult problems in the management of rheumatic fever is to determine when the active process is at an end and how rapidly the patient should resume normal life. Even if there is no clinical or laboratory evidence of cardiac involvement, the majority of students of rheumatic fever would advocate at least two or three months of bed rest following the onset of an acute rheumatic episode. After this period, the return to full activity should be gradual. It would scarcely seem wise to permit strenuous exercise within three months of the onset of rheumatic fever. Journal, A.M.A., Dec. 9, 1950, p. 1323.

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**School Accidents:** During 1949-1950, "School building accidents outnumbered accidents on school grounds; the greatest source of school building accidents was the gymnasium, with a rate of 0.4 for basketball and 1.0 for all other gymnasium activities. Considering the small proportion of time spent in the gymnasium, this rate is particularly noteworthy." Safety Education, December, 1950. p. 8.

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## MEETING

American Association for Health, Physical Education and Recreation at Detroit, Michigan, April 14 - 20, 1951.